

# Monica Barney, Ph.D.

181 Bartlett Street #11, San Francisco, CA 94110  
(415) 279-0157 monica\_barney@yahoo.com

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## EDUCATION

### University of California, Berkeley

Ph.D. in Materials Science and Engineering, Minor in Mechanics, 2005

Thesis: *X-ray Microdiffraction Investigation of Strain Gradient Plasticity Theories*

Advisor: Prof. Robert O. Ritchie

Awards: Student Employee Graduate Research Fellowship (SEGRF), 2001-2005

: DOE Fellowship to attend 50th meeting of Nobel Laureates, Germany, 2000

### University of California, Berkeley

M.S. in Materials Science and Engineering, 1998

Thesis: *Thermomechanical Fatigue of Micro-Solder Joints*

Advisor: Prof. J.W. Morris, Jr.

### California State University, Fresno

B.S. in Chemistry, Minor in Physics, 1995, *summa cum laude*

Awards: Most Outstanding Undergraduate in Chemistry, 1995

: California State University Predoctoral Program Fellowship, 1994

## EXPERIENCE

### Nitinol Devices and Components (a Johnson & Johnson company), Fremont, CA, 2005-2007

Staff Engineer (Research Division)

- Overcame pre-existing FDA rejection of experimental plan developed to address the need for new device designs in the more severe stress environments of non-cardiovascular applications. Selected to be part of the cross-discipline group of experts in biomechanics, mechanical testing, and metallurgy. Planned, developed, and executed original fatigue testing methods and modeling that successfully addressed FDA concerns.
- Corrected and optimized the sample fabrication process for a synchrotron X-ray microdiffraction investigation of orientation effects in Nitinol tubes, clearing doubt cast on prior results due to sample inconsistencies. Successful data collection and analysis has been completed and a paper from this work is currently in preparation.
- Participated in ongoing development of novel strain measurement and analysis techniques using synchrotron X-ray diffraction. Multifaceted project linking experiments at NDC and Stanford as well as collaboration with California Institute of Technology, building off of previous digital image correlation work for an in situ combination of strain detection methods aimed at improving the understanding of micromechanical response of materials.

### Lawrence Livermore National Laboratory, Livermore, CA, 1999-2005

### Lawrence Berkeley National Laboratory, Berkeley, CA, 1996-2005

Graduate Student Research Employee

- Sought out collaborative, high impact project at a large research organization interested in a joint university effort. Awarded grant and fellowship funding from proposals and applications.
- Wrote successful user proposals to conduct experiments at the Advanced Light Source and the National Center for Electron Microscopy. Completed and maintained training for membership to the Berkeley Microfabrication Facility.

- Developed extensive expertise and knowledge in the operation and repair of equipment for ultrahigh vacuum (UHV) diffusion bonding, servo-hydraulic mechanical test frames, and synchrotron X-ray diffraction. Experienced in microfabrication techniques such as photolithography, wafer dicing, sputter deposition, and flip-chip ball grid array processing.

#### **University of California, Berkeley, Berkeley, CA, 1997 and 1999**

Graduate Student Instructor for Professor JW Morris, Jr.

- Conducted lectures and provided experimental training and supervision for several Introduction to Materials Science laboratory class sections.
- Promoted to lead student instructor for a class of 300 students. Responsible for coordinating instruction effort of homework graders, other student instructors, and Professor, in addition to continuing to teach several laboratory sections.

#### **IBM Almaden Research Center, San Jose, CA, Summer 1994 and Winter 1995**

Research Assistant

- Synthesized, developed, and tested polymer photoresist to analyze and improve performance
- Worked closely with supervisor and related groups to coordinate data analysis projects

### **PUBLICATIONS**

- **MM Barney**, A Mehta, SW Robertson, AR Pelton, and RO Ritchie, “*Angular Dependence of Stress-Strain Response in Nitinol Flattened Tubes*”, in preparation
- **MM Barney**, GH Campbell, JS Stölken, A Mehta, and RO Ritchie, “*Scale Dependent Strength in Metals: the Effects of Orientation and Strain on Boundary Layers*”, in preparation
- **MM Barney** and MM Bartning, “*On the Microstructural Mechanisms of Shape Memory Effects*”, in Handbook of Smart Materials, CRC Press (a Taylor and Francis Company), submitted to editor
- AR Pelton, V Schroeder, MR Mitchell, XY Gong, **M Barney**, and S Robertson, “*Fatigue and Durability of Nitinol Stents*”, Journal of the Mechanical Behavior of Biomedical Materials (2007), accepted for publication
- **MM Barney**, GH Campbell, JS Stölken, A Mehta, and RO Ritchie, “*X-ray Microdiffraction Investigation of Plastic Deformation of Constrained Systems: Boundary Effects and Their Implications for Strain Gradient Plasticity*”, Proceedings from International Conference on Plasticity, Halifax, Nova Scotia, 2006
- AR Pelton, A Mehta, L Zhu, C Trepanier, V Imbeni, S Robertson, **M Barney**, and A Minor, “*TiNi Oxidation: Kinetics and Phase Transformations*”, Proceedings of an International Conference on Solid-Solid Transformations in Inorganic Materials, Vol. 2., p 1029, The Minerals, Metal & Materials Society, Warrendale, PA, 2005
- **MM Barney**, GH Campbell, JS Stölken, AJ Schwartz, JM Plitzko, WE King and, JW Morris, Jr., “*Experimental Assessment of Strain Gradient Plasticity Theories*”, Multiscale Modeling of Materials, MRS Proceedings Volume 653, pp Z8.6.1, Warrendale, PA, 2001.
- **MM Barney** and JW Morris, Jr., “*Observations of Microstructural Coarsening in Micro Flip-Chip Solder Joints*”, Journal of Electronic Materials **30**(9), (2001) 1088

### **PRESENTATIONS**

Invited

- “*Measurement of Local Strain of Advanced Materials Using Synchrotron X-ray Diffraction*”, ASM Meeting, Silicon Valley Chapter, Palo Alto, CA February 2007
- “*X-ray Microdiffraction Investigation of Plastic Deformation of Constrained Systems: Boundary Effects and Their Implications for Strain Gradient Plasticity*”, International Conference on Plasticity, Halifax, Nova Scotia, July 2006

- "*Probing Mechanical Deformation and Failure via Synchrotron X-rays*", Workshop at SSRL Users' Meeting, Menlo Park, CA, October 2003
- "*Application of X-ray Microdiffraction to Materials and Environmental Sciences*", Workshop at ALS Users' Meeting, Berkeley, CA, October 2002

#### Submitted

- "*Determination of Local Strain for a More Fundamental Understanding of Mechanical Response in Materials*", The Materials, Metals & Materials Society Spring Meeting, New Orleans, LA, March 2008, abstract accepted
- "*X-ray Diffraction Investigation of Strain Gradient Plasticity Theories*", The Materials Research Society Fall Meeting, Boston, MA, November 2004.
- "*Observation of Microstructural Coarsening in Micro Flip-Chip Solder Joints*", The Materials, Metals & Materials Society Spring Meeting, New Orleans, LA, February 2001.
- "*Experimental Assessment of Gradient Plasticity*", The Materials Research Society Fall Meeting, Boston, MA, November 2000.